

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
RA226 ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #1100243

Project: Dimock Residential GW Site, Dimock, PA
Analysis method: Radium-226 in Water: Rapid Method for High-Activity Samples
Report ID: 1100243-RA226
Report type: Original
Date reported: 03/14/2012
Total pages in report: 30

SAMPLES

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01194D	FB01	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01195E	HW19	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01196F	HW19-P	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01197G	FB05	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01198H	HW24-P	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01199J	FB03	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01200H	HW01	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01201J	HW02	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01202K	HW02Z	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01203L	HW08A	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01204M	HW04	PA:DIMOCK	WATER-DRINKING	01/24/2012	01/31/2012
B2.01205N	HW05	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01206P	HW12	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01207Q	HW14	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01208R	HW14-P	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01209T	FB04	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01210K	EB01	PA:DIMOCK	WATER-DRINKING	01/28/2012	01/31/2012
B2.01211L	HW17	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01212M	HW24	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01213N	FB02	PA:DIMOCK	WATER-DRINKING	01/24/2012	01/31/2012

EXCEPTIONS

1. **Packaging and shipping**—No problems were observed.
2. **Documentation**—No problems were observed.
3. **Sample preparation**—No problems were encountered.
4. **Analysis**—No problems were encountered.
5. **Holding times**—No holding times were specified.

QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Yields**—All chemical yields were within acceptance limits.
3. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

Mary Wisdom
Mary F. Wisdom
Quality Assurance Manager, NAREL

3-16-12
Date

John G. Griggs (Acting CERLS Dir)
John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

3-27-12
Date

for

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

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SDG #1100243

ANALYSIS SUMMARY

Analysis Procedure: NAREL RA226-EICHROM
Title: Radium-226 in Water: Rapid Method for High-Activity Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01194D	DUP	N/A	02/14/2012	0015706G	0008443A
B2.01195E		N/A	02/14/2012	0015706G	0008443A
B2.01196F		N/A	02/14/2012	0015706G	0008443A
B2.01197G		N/A	02/16/2012	0015716J	0008443A
B2.01198H		N/A	02/15/2012	0015712E	0008443A
B2.01199J		N/A	02/14/2012	0015706G	0008443A
B2.01200H		N/A	02/15/2012	0015712E	0008443A
B2.01201J		N/A	02/15/2012	0015712E	0008443A
B2.01202K		N/A	02/15/2012	0015712E	0008443A
B2.01203L		N/A	02/15/2012	0015712E	0008443A
B2.01203L		N/A	02/15/2012	0015712E	0008443A
B2.01204M		N/A	02/14/2012	0015706G	0008443A
B2.01205N		N/A	02/14/2012	0015706G	0008443A
B2.01206P		N/A	02/15/2012	0015712E	0008443A
B2.01207Q		N/A	02/14/2012	0015706G	0008443A
B2.01208R		N/A	02/16/2012	0015716J	0008443A
B2.01209T		N/A	02/16/2012	0015716J	0008443A
B2.01210K		N/A	02/16/2012	0015716J	0008443A
B2.01211L		N/A	02/14/2012	0015706G	0008443A
B2.01212M		N/A	02/14/2012	0015706G	0008443A
B2.01213N		N/A	02/16/2012	0015716J	0008443A
LCS-00630567T *	LCS	N/A	02/16/2012	0015716J	0008443A
RBK-00630566R *	RBK	N/A	02/14/2012	0015706G	0008443A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01194D	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:54	1000.0	AS33	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.46e-03	5.0e-02	1.1e-01	PCI/L	02/12/2012 10:59 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01195E	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:54	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.48e-01	1.1e-01	1.2e-01	PCI/L	02/12/2012 11:19 CST

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SAMPLE ANALYSIS REPORT

Sample #:	B2.01196F	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:54	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.76e-01	1.2e-01	1.2e-01	PCI/L	02/12/2012 11:16 CST

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SAMPLE ANALYSIS REPORT

Sample #:	B2.01197G	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015716J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 16:33	1000.0	AS33	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.65e-02	7.9e-02	1.1e-01	PCI/L	02/14/2012 11:02 CST

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01198H	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS33	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.50e-01	1.4e-01	1.1e-01	PCI/L	02/13/2012 12:30 CST

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01199J	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:54	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	9.05e-02	9.0e-02	7.8e-02	PCI/L	02/12/2012 10:59 CST

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01200H	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.89e-01	1.5e-01	1.2e-01	PCI/L	02/13/2012 12:14 CST

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01201J	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.82e-01	1.2e-01	1.1e-01	PCI/L	02/13/2012 12:29 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01202K	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.32e-01	1.0e-01	7.1e-02	PCI/L	02/13/2012 12:38 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01203L	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS39	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	9.29e-02	8.8e-02	9.4e-02	PCI/L	02/13/2012 12:17 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01203L	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	3.18e-02	6.7e-02	1.1e-01	PCI/L	02/13/2012 12:14 CST

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01204M	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:55	1000.0	AS39	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.51e-01	1.3e-01	8.6e-02	PCI/L	02/12/2012 11:14 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01205N	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:55	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.07e-02	7.9e-02	1.2e-01	PCI/L	02/12/2012 11:12 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01206P	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015712E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2012 16:01	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.51e-01	1.4e-01	1.1e-01	PCI/L	02/13/2012 12:25 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01207Q	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:55	1000.0	AS43	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	8.86e-02	9.0e-02	1.1e-01	PCI/L	02/12/2012 11:19 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01208R	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015716J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 16:33	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	6.58e-02	8.4e-02	1.2e-01	PCI/L	02/14/2012 11:16 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01209T	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015716J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 16:33	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	4.84e-02	7.5e-02	1.2e-01	PCI/L	02/14/2012 11:09 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01210K	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015716J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 16:33	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	8.06e-02	8.0e-02	7.0e-02	PCI/L	02/14/2012 10:58 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01211L	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:55	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.43e-01	1.1e-01	1.1e-01	PCI/L	02/12/2012 11:09 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01212M	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015706G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:55	1000.0	AS48	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.68e-01	1.2e-01	1.2e-01	PCI/L	02/12/2012 11:00 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01213N	QC batch #:	0008443A
Matrix:	WATER-DRINKING	Assay batch #:	0015716J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 16:33	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.57e-02	5.8e-02	1.1e-01	PCI/L	02/14/2012 10:57 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00630567T	QC batch #:	0008443A
Matrix:	N/A	Assay batch #:	0015716J
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2012 16:33	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	3.26e+00	3.4e-01	2.1e-02	PCI	02/14/2012 10:56 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00630566R	QC batch #:	0008443A
Matrix:	N/A	Assay batch #:	0015706G
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/13/2012 16:54	1000.0	AS82	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	8.39e-03	1.5e-02	2.4e-02	PCI	02/12/2012 11:06 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 1100243

QC BATCH SUMMARY

QC batch #: 0008443A
Preparation procedure: N/A
Analysis procedure: NAREL RA226-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
B2.01194D	DUP	87.49 %	7.44 %	PH
B2.01195E		85.91 %	7.33 %	PH
B2.01196F		85.21 %	7.19 %	PH
B2.01197G		84.49 %	7.51 %	PH
B2.01198H		87.81 %	7.72 %	PH
B2.01199J		78.53 %	6.89 %	PH
B2.01200H		82.94 %	7.37 %	PH
B2.01201J		89.49 %	7.68 %	PH
B2.01202K		86.03 %	7.60 %	PH
B2.01203L		81.65 %	7.17 %	PH
B2.01203L		85.08 %	7.39 %	PH
B2.01204M		89.06 %	7.38 %	PH
B2.01205N		80.16 %	6.88 %	PH
B2.01206P		81.62 %	7.34 %	PH
B2.01207Q		84.50 %	7.23 %	PH
B2.01208R		85.75 %	7.56 %	PH
B2.01209T		84.23 %	7.36 %	PH
B2.01210K		88.21 %	7.70 %	PH
B2.01211L		83.41 %	7.20 %	PH
B2.01212M		83.59 %	7.16 %	PH
B2.01213N		86.38 %	7.47 %	PH
LCS-00630567T *	LCS	87.99 %	7.70 %	PH
RBK-00630566R *	RBK	79.75 %	6.99 %	PH

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**National Air and Radiation Environmental Laboratory
QC Batch Report**

QC Batch #: 0008443A

Analytical Method: NAREL RA226-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00630566R	RA226	$8.39\text{e-}03 \pm 1.5\text{e-}02$	2012-02-12	OK

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01203L	RA226	$9.29\text{e-}02 \pm 8.8\text{e-}02$	$3.18\text{e-}02 \pm 6.7\text{e-}02$	97.89	-1.10 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00630567T	RA226	$3.37\text{e+}00 \pm 3.4\%$	$3.26\text{e+}00 \pm 3.4\text{e-}01$	96.75	-0.61 OK

Analyst: *Pat Honsa* 16 Feb 2012
Honsa, Patricia

QA Officer: *Kim J McNamee* 2/16/12

Method Blanks

Analyte: RA226

Method: NAREL RA226-EICHRM

Analyst: Honsa, Patricia

PA 16 Feb 2012

